International Journal of Educational
Science and Research (IJESR)
ISSN (P): 2249-6947; ISSN (E): 2249-8052
Vol. 8, Issue 4, Aug 2018, 39-44

OCCUPATIONAL HEALTH PROBLEMS AMONG WORKERS IN CONCRETE BASED MANUFACTURING INDUSTRY – A REVIEW OF RESEARCH

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ABSTRACT

The present paper reviews the literature on the prevalence of health problems among workers working in concrete industries to inform current investigations and identify areas of future research. Reviewed studies examined different health problems that are caused due to exposure to the dusty environment in cement and concrete manufacturing industries. The findings indicate that workers were prone to different respiratory and skin related problems and incidence of musculoskeletal symptoms. However, additional research on understanding the potential risks of concrete related health issues and injuries is needed. The various organ systems which got affected because of working with cement and concrete were found to be tuberculosis, stroke, chest pain, pneumonia, irregular heartbeat and allergic reactions that interfered with lung cancer.

KEYWORDS: ***Occupational Health, Concrete & Musculoskeletal Disorders***

Received: May 24, 2018**; Accepted:** Jun 07, 2018**; Published:** Jul 27, 2018**; Paper Id.:** IJESRAUG20186

A Review

INTRODUCTION

Literature to Find the Cause of Adverse Health Effects among Workers and Workplace Injuries at Concrete Product Manufacturing Industries

Concrete making industry manufactures the of product that generates dust during its production as cement was used in the highest amount while making concrete products which produces dust that affects workers health. Studies had shown that cement dust in the concrete making may enter into the systemic circulation and thereby reach all the organs of the body and affects the different tissues including heart, liver, spleen, bone, muscles, and hairs and ultimately affecting their microstructure and physiological performance. Cement contains hexavalent chromium, which is a human carcinogen. However, its effect on cancer seems inconclusive in epidemiologic studies. The aim of this retrospective cohort study was to elucidate the association between dust exposure in the cement industry and cancer occurrence. Manjula *et.al* (2013) studied the effects of occupational dust exposure on the health status of cement factory workers, which showed that the maximum exposure to dust were proned by employees in a crushing and mixing department where-as prevalence of chest tightness and chronic bronchitis were highest in loading and storage department workers (Mandal, 2013). Blood pressure was also one of the health effect found to be higher among the exposed workers and had a stuffy nose in concrete making industry. The increased standardized mortality ratios (SMR) were found for lung cancer and urinary bladder cancer among male concrete workers due to cumulated exposure to cement dust but cancer incidence was not found to be increased among females (Smailyte, *et.al*., 2004). The Irregular heartbeat and Chest pain was

usually found to be occurring when cardiovascular system got affected.

WORK-RELATED RESPIRATORY PROBLEMS AMONG WORKERS

The major respiratory symptoms prevalent among concrete workers were found to be wheezing, asthma, and cough (Subramanyam, *et.al* 2010). Especially the smokers of the cement industry were at higher risk of developing chronic bronchitis and wheeze than non-smokers (Bergdahl, *et.al*, 2004). A chronic cough was the common symptom found in all the laborers and incidence of respiratory symptoms was also higher in them (Dietz, *et.al* 2004). Acute reduction of respiratory functioning was more among workers exposed to dust and cement. When the dust in the breathing zone of the workers and Peak expiratory flow (PEF) was measured by Kebede (2011) it was found higher among cleaners in the industry and also the Stuffy nose (85 %), shortness of breath (47 %) and sneezing (45 %) were the most prevalent acute respiratory symptoms among the high exposed workers.

Work-related Respiratory Symptoms were (Masoud and Alireza, 2007) examined by Chest X-ray and lung function tests which determined the silica phases and contents of the dust in the concrete workers. The Chronic respiratory symptoms were found to be highly correlated with increased total dust exposure but it is independent of smoking habits (Dietz, *et.al*., 2004). More Levels of exposures to inhalable and respirable cement dust lead to the symptoms like a regular cough, wheezing and shortness of breath whereas Cough and phlegm (sputum) (Ballal, et.al., 2008) were found to be related to cigarette smoking. Age, nature of work and smoking (Shiraz, *et.al*, 2012) were found to be the strong predictors of developing these symptoms and illnesses among workers. The other sources that were contributing to dust concentrations that had caused respiratory illness, particularly at the site was while using a broom, outdoor wind and presence of rain were overall the most influential factors affecting inhalable dust exposure.

WORK-RELATED SKIN PROBLEMS AMONG WORKERS

Though a number of studies had been carried out to find the respiratory health problems among these concrete and cement workers, (Subramanyam, *et.al* 2010; Bergdahl, *et.al*, 2004; Mandal, 2013), very few studies, (Ghotkar, *et.al*, 2005; Raffle, *et.al*, 2000) particularly from India, had reported the different skin problems among these workers. Due to hygroscopic, nature of the cement it pulls moisture from the skin that contained sensitizing chemicals and metals. However, the alkaline, abrasive, and hygroscopic properties of cement in concrete, mortar, grout, plaster, stucco, and other products were universal (Roto, 1996) cause for skin problems. A review of the available literature suggested that cement had constituents that produce irritant contact dermatitis, corrosive effects and sensitization, leading to allergic contact dermatitis, (Frimat and Bock 2002). These skin conditions usually included contact dermatitis, cement burns, etc. However, contact dermatitis was one of the most frequently reported health problems among the concrete workers. These skin conditions usually included were contact dermatitis, friction callosity, cement burns, etc. Dermatitis among cement workers was examined clinically using the patch test on hands which resulted that the occurrence of allergic contact dermatitis and irritant contact dermatitis.

CONCRETE WORK-RELATED MUSCULOSKELETAL DISORDERS

Work-Related Musculoskeletal Disorders (WMSD) describes a group of workplace injuries and diseases related to the soft tissue structures of the body including bones, muscles, ligaments, tendons, and discs in the spine. WMSD can occur suddenly and they can take long periods to develop and recover. Concrete workers perform many physically demanding tasks that exposed them to risk factors for musculoskeletal injuries. Previous research studies showed that the

association between occupational factors, such as awkward postures, repetitive motions, heavy lifting and low-back disorders among concrete workers (Hess *et al*., 2003). According to Burdorf, *et.al* (2011), the average time spent working with a bent or twisted position of the back was found to contribute to the prevalence of back pain and also exposure to whole-body vibration was a risk factor for back pain. Goldsheyder, et.al (2004) determined musculoskeletal injury characteristics among the cement and concrete workers and identified the most problematic work-related activities and job factors that contributed to the occurrence of these disorders. He had also found that a large proportion of the laborers (77%) had experienced at least one musculoskeletal disorder in the one year and low back pain was reported as the most frequently experienced symptom (66%). The concrete workers perceived bending or twisting the back, work in hot, cold or wet conditions, and handling heavy objects as the major problem and the problematic workrelated activities

NECK/SHOULDER PAIN OR DISORDERS

Several studies have concluded that awkward neck or trunk postures were associated with neck pain or disorders. Other physical risk factors linked to these disorders were repetitive work with arms, use of hand force sedentary work and working with elevated upper hands. There are very few previously published reviews related to shoulder pain or disorders. Poul,*et al.* (2002) concluded that heavy physical workload, repetitive movements, and awkward postures were associated with shoulder pain. Julie (2012) reported that the risk factors for shoulder pain were highly repetitive, static work with the arms abducted or elevated. In addition, lifting heavy weights (Harkness *et al*. 2003, Miranda *et al.* 2008), carrying, pushing and pulling (Hoozemans *et al*. 2002) high force application had shown to be risk factors for shoulder pain.

ELBOW, WRIST AND HAND PAIN OR DISORDERS

The most common disorders in the distal upper limb were the hand and wrist tendinitis, and carpal tunnel syndrome. The reviews have concluded that highly repetitive work with the hands, use of high hand force, and especially the combination of these two factors increased the risks of these disorders. However, these conclusions should be interpreted with caution, because there are few high-quality longitudinal studies (Vingard 2000)

BACK AND LIMBS PAIN

Back injuries Low back pain is the most common and costly of work related musculoskeletal disorders (Ute, 2000). Back injuries included, spinal disc rupture particularly of the lower lumbar spine, nerve compression the most common is sciatica nerve pain, muscle spasm of the back hip muscles, aggravation of a pre-existing degenerative condition. The major causes of back injuries were, manual tasks such as lifting, pushing and pulling frequent twisting postures, slipping, tripping and falling, static sitting or standing for long periods, sustained fixed postures even the most comfortable, vibration (Goldsheyder, *et.al*, 2004, Hoozemans, *et.al* 2002).

Upper limb injuries are common in processing, production and manufacturing industries. They affect nearly all soft tissues of the upper limb including muscles, tendons, tendon sheaths, nerves and blood vessels and may affect the lower limb. Common injuries included tendon disorders, nerve disorders and neurovascular disorders which affects the circulatory and nervous systems (Karen,*et.al.*, 2008). Upper limb injuries were caused by repetitive motions (such as packing or sorting), static postures or forceful exertions such as lifting a heavy load, vibration, compression or contact stress, awkward postures, working in low temperature, prolonged duration, and frequency of work and psychosocial stresses (Trevelyan, 2001)

CONCLUSIONS

Workers in the concrete manufacturing industry were exposed to a variety of health hazards, namely, musculoskeletal strain from the adoption of uncomfortable working positions, noise-induced hearing loss, skin diseases from close contact with an irritant or sensitizing materials, respiratory irritation from dust, fumes, and gases, as well as more serious lung diseases. The review concluded that the major occupational diseases in industrial workers required attention were silicosis, lead poisoning, diseases of joints and bones, carbon monoxide, and benzene poisoning, skin diseases. The stress due to work burden, repetitive work, and job uncertainty were present. Use of asbestos, silica, quartz in this industry and direct exposure had lead to different diseases like lung cancer, gastrointestinal cancer. According to several reviews manual material handling and frequent bending and twisting are the risk factors for back disorders and upper limb injuries were caused due to repetitive motions static postures, awkward postures. Low-back and shoulder complaints among workers also had a strong relationship with that of with pushing and pulling tasks. These workers indicated pain in the neck, wrist, back, lower limbs and shoulders are prevalent, which are indicative signals of musculoskeletal disorders, work absenteeism and reduced productivity. Several workplace factors, such as repetitive work, awkward and static postures were identified as being the causes of upper extremity pain and discomfort.

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